MACKENZIE (J. N.)

REVIEW OF

Hay Fever, its Etiology and Treatment, with an Appendix on Rose Cold.

BY

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REVIEW.

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There are many positions encountered in the writings of medical men which by virtue of their common acceptance have come to be regarded in the light of axiomatic truths either from slavish adherence to authority or indifference to inquiry into their claims to scientific recognition. In this way transmission of error is often encouraged by those who, bowing with reverence before the dignity of age and established usage, unconsciously receive the fallacies taught in school and text-book as primal or fundamental principles of their medical knowledge. The emancipation of the professional understanding from the error of first impressions derived from the dogmatism of teacher and writer is a process of tardy evolution, and it is therefore easy to see how false doctrine universally received and taught by medical men should, when announced by them to the laity, find ready access to the unprofessional mind and influence the popular judgment. The general popularity of the pollen theory of the disease falsely called "hay fever" affords a striking illustration of the truth conveyed in the above reflections. It has been universally taught for years that this affection is due to some mysterious agency contained in the granules of pollen, and the laity have been disciplined by their medical advisers into the belief that the curious *ensemble* of its phenomena is in some inexplicable manner produced by the emanations from grasses and flowers. There is a certain charm about this superstition which commends it at once to the fancy. It is seemingly so natural and plausible to connect the phenomena of the disease with the flowering of certain plants, and the mind so naturally gravitates toward the easiest and most poetical explanation, that it is not surprising that this view should have obtained such universal dominion over the thoughts of the profession and laity. Even those who have in recent years partially forsaken the beaten track into which it has led them are still to a great extent under the influence of its power, and it is therefore not unnatural that not only the profession, but the laity, dominated by the precepts of a doctrine of almost universal acceptance, should receive the alleged relation of the pollen granule to the phenomena of "hay fever" as a fundamental truth, and rest content with the lazy explanation of the affection which it affords.

During the past few years this theory has been slowly driven to the wall chiefly through the investigations of American observers, and new conceptions of the disease have arisen, which, if they have not reached

the solution of its pathology, have at least placed this hitherto incurable complaint on the list of curable affections.

The essay before us is an apology for the pollen theory, and challenges attention, not on account of originality in the subject-matter, for the line of reasoning is essentially the stereotyped one so long employed by the advocates of this view, but because a representative man, like Dr. Mackenzie, has undertaken to lead the forlorn hope of a dying hypothesis against the host of facts which are daily marshalling themselves against it.

In view of its many inconsistencies and contradictions, and in the light of recent observation, the refutation of the pollen theory seems a work of supererogation, but, in justice to our distinguished author, we will call attention to a few of the many unanswerable objections which bear directly on his contention.

The orthodox articles of Dr. Mackenzie's accepted faith are embraced in the following fundamental propositions: (1) That the disease is produced by the pollen of grasses and flowers, the granules of which are endowed with a peculiar vitalized principle which possesses "exceptional qualities . . . as a living organism capable of undergoing some degree of development when deposited on mucous membranes more or less exposed to the air;" (2) that, as the pollen granules containing this vital principle are only one-tenth the size of the blood-corpuscles, it is highly probable that they enter the bloodvessels by actual penetration of their walls, and it is not improbable that the *malaise* experienced in hay fever is due to the presence of this granular matter in the general circulation. In accordance with this view, he has selected as the motto for his essay the well-known Virgilian proverb "*latet anguis in herbâ.*" At the same time, he confesses, with those he follows, that the persons liable to be thus affected by pollen are possessed of a peculiar idiosyncrasy, although upon what the latter depends is "quite unknown." In other words, Dr. Mackenzie advocates the theory which derives its popularity mainly from the writings and experiments of Blackley, in whose footsteps he closely treads.

Let us consider these positions in detail, and in the first place inquire, "Is there anything in pollen to produce the disease in question?"

Dr. Mackenzie makes the unqualified assertion that "Blackley's experiments leave no doubt that the cause of hay fever is *the action of pollen on the mucous membrane.*" To this statement we must respectfully, but emphatically demur. While due credit should be given for the painstaking way in which Mr. Blackley conducted his experiments, it must be at the same time acknowledged that they fell far short of the accomplishment of the object for which they were carried out. They prove one thing, and one only, that in an isolated case, and that his own, at least pollen *may act as an exciting cause of the paroxysms* of the disease. They by no means show, as Dr. Mackenzie and others wrongly infer, that pollen is the sole exciting cause of the paroxysm, and that the latter may not be produced by heat, light, and other external agencies. The negative effects of heat, light, and ozone in his own case are utterly valueless in view of the demonstrated fact that these agents excite the paroxysm in many other individuals. So far from proving that "hay fever" is due to the action of pollen on mucous membranes, they fail to throw any light whatever upon the true cause of the affection. It is not our object in this review to expose the many vulnerable sides of Blackley's work, which is so often quoted, but apparently so rarely read. His conclusions have been handed down from author to author as *ex cathedrâ* utterances from which

there is no appeal. While his experiments were carried out in the first instance presumedly in a strictly scientific spirit, it is sufficiently evident, from his subsequent publications, that his mind was so swayed by the pollen theory as to render it unreceptive to new facts and new discoveries. Neither he nor his followers attempt to reconcile the inconsistencies and contradictions which are the logical outcome of his hypothesis. As a specimen of his line of reasoning, the powerful blow which Beard dealt the pollen theory is met with the observation that the gentleman is a member of two neurological societies, and that, therefore, the researches of this notoriously painstaking and accurate observer are open to serious objection.

While Blackley showed that in his own case pollen acted as an exciting cause of the paroxysms, it has, on the other hand, been conclusively demonstrated that there are a host of other agencies, external and internal, which produce exactly the same result. Our own observations, based on the analysis of a large number of cases, teach (1) that there is practically an infinite number of causes which may precipitate the attack; (2) that one irritant is of itself insufficient to produce the paroxysm, the latter being only possible from abnormal functional activity of the nerve-centres, inherited or acquired; (3) that in the majority of cases the paroxysms are induced by a variety of agencies differing entirely in character and mode of operation; even in those cases in which there is apparently only one exciting cause, it will generally be discovered that there are conditions which bring about the attack other than the alleged solitary exciting cause; (4) that the latter may be operative only during certain periods of the year, or may provoke a paroxysm, without regard to season, whenever applied; (5) that it may be said, in general, that the exciting cause may produce its effect, by direct or indirect (reflex) irritation of the sensitive nerves of the nasal and other mucous membranes; through olfactory impression or through simple association of ideas; or the same result may be brought about by physical or mental over-exertion or emotional excitement; (6) that typical paroxysms occur in some persons at any season of the year, from a variety of causes, but especially from sudden changes in the temperature, or from electrical disturbances of the atmosphere; (7) that paroxysms may be produced as reflex phenomena from irritation of a distant organ, or from some excitation starting in the nerve-centres themselves; (8), finally that pollen is only one of a host of exciting causes, and there is reason to believe that in some cases in which it is supposed to be the excitant, it has little or no influence at all.

As an illustration of the effect of a purely psychical impression in the production of the paroxysm, we would call attention to our experiment with an artificial flower related at the last meeting of the Laryngological Association. Dr. Mackenzie alludes to an exceedingly interesting case of his own, which supports the views concerning an occasional psychical element in the etiology, although he gives to it an interpretation which, in our opinion, is unwarrantable. A victim of "hay fever," after a visit to the Royal Academy, where she had seen a highly realistic hay-field of Mr. Vicat Cole, had a severe attack of the disease. Dr. Mackenzie hesitates between the natural explanation afforded by the association of ideas, and the possibility of her having passed a hay-cart on her way home; "the latter solution, if more prosaic," is also, according to him, "more probable."

There is another case in literature identical with that mentioned by Dr. Mackenzie, and the two open our eyes to the fact that the association

of ideas sometimes plays a more important part in the production of a paroxysm than the supposed vital property of the pollen granule.

There is absolutely nothing in pollen to cause the group of phenomena known as "hay fever." To urge the existence of some inherent vital principle which develops a peculiar power when deposited on a mucous membrane is one of those gratuitous assumptions which from the insecure foundation upon which the pollen theory rests, and which have no scientific reason for their acceptance. It is certainly more rational and more in accordance with the facts in the case to infer that the influence of local irritants is mechanical or chemical, and that their power to excite a paroxysm depends upon their physical properties, and the length of their sojourn in the nasal chambers. The glutinous character of some substances, the irregular surfaces of others, will give rise, for example, to more prolonged irritation than substances of smooth contour and less tenacious qualities which are readily swept out of the nostrils. As the irritation of worms or morsels of undigested food retained for a long while in the gastro-intestinal canal give rise to convulsions, cough, and other reflex disturbances through the constant irritation of the readily impressionable nerve-centres of the infant, so the prolonged excitation of the hyper-sensitive vaso-motor centres of the "hay fever" sufferer by the external irritant may evoke the vaso-motor disturbances which are the leading characteristics of the complaint under consideration. The cause of the convulsion is not the worm or the undigested particle of food, but the prolonged action of a local irritant upon a naturally excitable nervous organization.

While nearly everybody is exposed to the action of pollen on the mucous membranes, comparatively few suffer from the disease, which latter is, moreover, most commonly met with among those least subjected to the alleged exciting cause; for, although confined to no particular class, it is a well-known fact that it is most frequently observed in the cities, and is comparatively rarely encountered among the agricultural population. The explanation of this consists in the fact that the latter are less predisposed to catarrhal affections in general, and disorders of the nervous system. At least, this is obviously more satisfactory than the position that constant exposure to the exciting cause produces tolerance. The occurrence of the disease in situations and under conditions in which the presence of pollen is out of the question strongly militates against the theory that pollen is the sole exciting cause. The relief or immunity from the disease found by the seashore and on the mountain top is readily explained by the well-known beneficial effects of these regions on catarrhal and nervous affections. In other words, the influence of locality upon the disorder is climatic and tonic, and has little to do with a diminished amount of pollen in the atmosphere of a given region. The depressant effect upon the nervous apparatus of the heated land breeze is probably more potent in the production of a paroxysm than the emanations that may be carried along with it. The occurrence of the disease far out at sea has been met by the assumption that clouds of pollen must have been wafted thousands of miles to the ship that carried the unfortunate victim, or that in the unfurling of the sails "a large quantity of pollen collected in their folds was set free," and is illustrative of the form of reasoning by which the advocates of the pollen hypothesis seek to escape from their dilemma. Indeed, the whole line of defence adopted by the pollen theorists is assumptive rather than demonstrative or argumentative, and consists in

an apparent endeavor to involve the logic of facts in a tissue of seemingly plausible suppositions.

Equally unanswerable objections to the pollen theory are those which relate to the influence of race, education, modes of life, climatic influences, geographical distribution, etc., while its inconsistency is shown in the fact that while the disease is supposed to be due exclusively to the emanations from plants, it is at the same time universally contended that the affection is one confined to the social and intellectual life of the present century. And so we might go on to enumerate many other facts fatal to the assumption that the disease is due to pollen, such as its complete disappearance in some summers, the non-correspondence of the hay season in America and the period of the attack (Wyman), the marked periodicity of the attack apart from the possible presence of pollen, its regular appearance at a certain hour and on a certain day, pointing to derangement of the nervous system, etc. etc. The alleged exact correspondence of the onset of the disease and the flowering of certain plants is unfortunately more apparent than real, and, according to our observation, the period of attack is related more to moisture or heat, or both combined, to rapid temperature changes, and to other thermometrical and barometrical conditions than to the presence of pollen in the atmosphere.

It will thus be seen that the influence of pollen is narrowed down to a very contracted sphere—that it is simply one of an indefinite number of external agencies which are capable of producing a paroxysm, and that there are excellent grounds for the belief that in many cases in which it is assumed to be the exciting cause, it has little or no influence at all except through the association of ideas.

Let us turn now to that portion of our author's creed which relates to the penetration of the vessel walls by the pollen granules and their accumulation as foreign matter in the blood. We cannot contemplate this proposition without an involuntary shudder, especially when we view it in the light of a possible destroyer of some of our most pleasant relations with the outer world. It is but just to Dr. Mackenzie to say that this luminous idea originated in the brain of a Mr. Wright Wilson, who some years ago flashed across the literary horizon in that highly instructive portion of the *London Lancet* devoted to notes and queries from correspondents. Dr. Mackenzie seems to have been the only mortal who caught the heavenly vision, and to him therefore belongs whatever credit attaches to the discovery of Mr. Wilson and his theory. As far as our knowledge goes, Mr. Wilson and Dr. Mackenzie are the only authors, living or dead, who have gravely announced their belief in this proposition, and we hazard the conviction that, upon reflection, the latter will leave to the former the exclusive honor to which he is most justly entitled. We even venture to predict that in the coming ages—ay, to the end of time —Mr. Wilson will remain the solitary champion of an idea which, for fertility of fancy and perfect independence of natural law, shines above all other such conceptions.

". . Velut inter ignes
Luna minores."

Dr. Mackenzie characterizes as "zealous bacteriomaniacs" those who seek in specific organisms the cause of the affection under review. If the germ-theorists be in truth "bacteriomaniacs," under what variety of mania do those fall who attribute such terrible properties to the innocent pollen granule?

While this remarkable theory may be regarded as illustrative of the extent to which the pollen advocates allow themselves to be carried by their dominant idea, it must nevertheless be confessed that it opens up an unending vista of possibilities to the speculative eye of the imagination. Through ciliated epithelium, basement membrane, and vessel wall, the dreadful vitalized amœboid pest of the summer months is launched into the general circulation. Does it feast on the nuclei of the white corpuscles as its legitimate prey, or does it seek its pabulum in the more organized and nutritious protoplasm of their redder and more numerous companions? Is it carried into remote organs on the crest of the serous wave, or is it whirled through the circulation on the back of the red blood-cell? Is the dyspnœa of this disorder due to pollen emboli in the lungs or to granular invasion of the respiratory centre? Are we at last to realize the poetic conception of

> ". . Quick effluvia darting through the brain,
> Die of a rose in aromatic pain"?

The solution of these and similar problems must be unfortunately deferred until a time when the human mind is ready for the conception of Mr. Wilson, when the diagnosis of the affection shall be made with the microscope, and when the blood-stained pollen granule will rank with the tubercle and comma bacillus as a priceless legacy of medicine to man.

We regard it easy of demonstration that pollen or any other form of matter is insufficient *of itself* to produce the disease or excite its paroxysms. The cause of the affection must therefore be sought, not in the outer world, but in some personal susceptibility to certain forms of irritation—some morbid condition of the system either as a whole or in part. While it is undoubtedly true that the inhalation of external irritants—and pollen is only one of a host of such substances—acts as an exciting cause of the paroxysm, it is at the same time beyond question that careful inquiry will discover its influence to be purely secondary or accidental, to be dependent upon some local or constitutional condition. The solution of the question lies then in the direction of some localized or systemic derangement of the subject himself.

That the development of the affection presupposes some morbid condition pertaining to the individual seems almost evident to intuition, and it is therefore surprising that its essential cause should have been so long sought for in objects derived from the external world. Even the most enthusiastic advocates of the theory of external causes are forced to admit an essential predisposing influence without which the exciting cause is inoperative, and in its admission they unwittingly wreck the theory they attempt to defend. Blackley himself acknowledged a special predisposition or idiosyncrasy, and Dr. Mackenzie, while in one portion of his essay advocating the pollen theory, pure and simple, in another announces his belief that the affection is an idiosyncrasy, that it is characterized by and leaves behind it no structural lesion, and is therefore destitute of a pathology!

The confession that the disease is an idiosyncrasy is inconsistent with the tenets of the pollen theory as formulated in the two main propositions of our author's contention,—is incompatible with the assumption that the disease is produced by the action of a peculiar vitalized principle (resident in pollen) upon the mucous membrane. If it be in truth an idiosyncrasy or innate peculiarity in the sense used by Dr. Mackenzie, it follows that the pollen theory is not only unnecessary, but fallacious. The admission of idiosyncrasy as the essential factor is a practical recognition of the in-

adequacy of the pollen speculation and a virtual surrender of the question. The explanation of the disease by the theory of idiosyncrasy and its explanation by the pollen theory represent two distinct and opposite ideas, two separate and antagonistic hypotheses. We fail to see, therefore, how this view, which may be appropriately termed the botanico-psychological theory, and which is formed of two mutually destructive propositions, brings us any nearer the solution of the pathology of "hay fever."

Idiosyncrasy is a word, not an explanation, which practically conveys no definite idea concerning the essential nature of the disease, and is tantamount to a confession of "learned ignorance." In a former communication, we observed that, when certain morbid phenomena were inexplicable by known pathological laws or did not come within the range of speculation based on experimental research, the term idiosyncrasy was sought as a convenient refuge for acknowledged ignorance. Dr. Mackenzie objects to this on the ground that the term is, on the contrary, "a convenient word to express certain series of phenomena which have not been explained." Now, as "idiosyncrasy" stands for a condition of which we have no knowledge, and of which we can form no conception, it involves the idea of hopeless ignorance. If we have no conception of a supposed state, it is idle to attempt its explanation by a mere word—an empty term, which, although suggestive in one respect, is at the same time a terse, emphatic way of expressing a defect in our knowledge and observation, and carries with it the inevitable confession that the matter to be explained is inexplicable. We consider, therefore, the use of the term employed by us and that cited by Dr. Mackenzie to be practically equivalent to the terms of an equation which will be found upon analysis to be equal to each other. It seems scarcely necessary to linger thus upon a matter so self-evident, but we cannot refrain from calling attention to the following words of Locke as pertinent to the subject of the present inquiry: "He that knows not what he himself meant by a learned term, cannot make us know anything by his use of it, let us beat our heads about it never so long. Whether we are able to comprehend all the operations of nature and the manners of them, it matters not to inquire, but this is certain, that we can comprehend no more of them than we can distinctly conceive, and, therefore, to obtrude terms where we have no distinct conceptions, as if they did contain, or rather conceal something, is but an artifice of learned vanity to cover a defect in an hypothesis or our understanding."

Dr. Mackenzie defends the idea of idiosyncrasy by means of illustration and comparison, but it should be remembered that the former is not explanation, the latter not argument. That Julius Cæsar Scaliger turned pale at the sign of a water-cress, that some persons are taken with nettle-rash after the ingestion of fish and fruit, certainly does not bring us nearer the conception of idiosyncrasy, much less the complicated etiological relations of "hay fever." Neither does the comparison instituted by Marsh between the effects of the poison-oak and those of the pollen granule throw any light upon the subject, for between the two there is neither parallel nor analogy.

To set aside, therefore, the important internal factor in the etiology of the affection, wherein the whole solution of the question lies, under the specious terms, special proclivity or predisposition, individual peculiarity or idiosyncrasy, is virtually equivalent to saying that we have no suffi-

cient explanation to offer, for, as Dr. Mackenzie himself justly remarks, "it would cease to be an idiosyncrasy if a satisfactory explanation could be arrived at." The more we reason in this direction, the more involved the subject becomes, and we are therefore not surprised that Dr. Mackenzie, weary of involution and obscurity, finally surrenders the whole ground in the following honest sentence: "Nevertheless, it must be freely admitted that no theory explains why pollen should prove a highly exciting substance to the mucous membrane of some persons, and not to others." "Hay fever" is not an idiosyncrasy, but a disease—a definite morbid state, the elucidation of whose phenomena must be sought in the study of pathological law, and not in an inquiry into the process of plant reproduction. But, it may be naturally asked, Is there any explanation of the phenomena of the disease which is better than that of an assumed "idiosyncrasy"?

Let us search for the answer to this question in the literature of the past decade. In 1876, Dr. George M. Beard, of New York, wrote a work on "hay fever," based upon carefully collected statistics, in which he surveyed the problem from a standpoint entirely different from that taken by previous investigators. As the result of his observations and inquiries, conducted in an accurate, scientific manner, he pronounced "hay fever" a functional disease of the nervous system, closely allied to sick-headache. Its alleged almost invariable appearance in the higher walks of life, and notably in those of superior intellectual attainment, together with its assumed absence among inferior races, was dexterously wrought by him into the conception that the affection is the offspring of a higher civilization, the outcome of a hypersensitive nervous organization, the result of the enervating influences of nineteenth century social and intellectual life. While he does not explain in what such a neurosis consists, while his researches and conclusions are open to fair criticism, they nevertheless threw a new light upon the subject, and opened up a broader and more scientific pathway of research. Whatever he failed to do, he established the important fact, that an important factor, if not the chief in the disease resides in some imperfectly defined condition of the nervous system. Hay fever, according to Beard, is the complex resultant of a number of different external exciting causes (30) acting upon a nervous system debilitated by the injurious influences of modern social and intellectual life.

Five years later another important fact in connection with the disease was brought to light by Dr. Daly, of Pittsburgh, who showed that in a fair proportion of cases there is local disease of the nose and nasal pharynx (from simple hyperæsthesia to pronounced structural changes, such as hypertrophic catarrh, polypi, etc.), without which the exciting cause (pollen, bacteria) is innocuous, and that the cure of the affection may be accomplished through removal of the local intrinsic condition (by cauterization with acid, electric cautery, etc.), a position which he established by most convincing practical proof. To this observer belongs the credit of formulating the treatment of the disease by measures addressed to the nasal and nasopharyngeal chambers. According to Daly, we are only justified in looking upon "hay fever" as a neurosis when the affection persists after removal of the local nasal disease. Daly attempted no explanation of the mechanism of the disease, but simply announced a clinical fact and the treatment based upon it.

The following year, Dr. Roe, of Rochester, published the successful results of his treatment of the disease by the operative method, and

related a number of cases in which a cure had been effected. According to him, the affection is due to the action of pollen upon the nasal mucous membrane, which in some persons is rendered peculiarly susceptible by active or latent disease of the naso-pharynx associated with hypertrophic catarrh of the nasal passages. The asthma and other manifestations of the paroxysm are due, he believes, to reflex congestion of the mucous membranes of the several organs in which their effects are manifested. While Dr. Roe believes the exciting cause to be pollen, he at the same time contends that, in order to the production of a paroxysm, "latent or active," nasal disease must be present, that the nervous symptoms are secondary to the hyperæsthetic condition of the nostrils, and that the latter is not the effect but the cause of the neurotic feature of the disease.

In the same year we published the results of some experiments made by us with reference to the localization of reflex sensitive areas in the nasal passages, which, we venture to believe, throw some further light upon the subject. These observations led us to the belief that the area most sensitive to reflex producing impressions is represented by that portion of the mucous membrane which covers the turbinated corpora cavernosa, that reflex acts are only exceptionally awakened from irritation of other portions of the nasal fossæ, and that all parts of the erectile area are not equally susceptible to irritation, the most sensitive spots being located in the mucous membrane covering the posterior extremity of the inferior turbinated body and the septum immediately opposite. These views of the sensitive area were opposed by Dr. Hack, of Freiburg, who maintained that all reflexes arise from congestion of the cavernous tissue of the anterior end of the inferior turbinated bone. The views of Hack on "hay fever" are similar to those of Daly and Roe. According to him, two factors are necessary to the paroxysm, a hyperæsthetic condition of the terminal filaments of the fifth and olfactory nerves and an increased irritability of the cavernous tissue, caused, as a rule, by local nasal disease, and he inclines to the belief that the neurasthenic symptoms are secondary to the nasal affection.

In 1884, a still more exclusive view was put forth by Dr. Harrison Allen, of Philadelphia, who held that the affection depended solely upon obstruction or tendency to obstruction in the nasal passages; he also called attention to the fact that (in his experience) in the sufferers from this disease, the inferior turbinated bones lie well above the floor of the nostril, a condition which subjects the mucous membrane covering them to additional irritation from external causes. These observations of different physicians, working independently of each other, viewing the subject from different standpoints, while not perfectly harmonious, nevertheless present a singular unanimity in their recognition of the necessity of therapeutic measures addressed to the nasal passages as a prime factor in the treatment of the disease. While they render it probable that certain states of the nasal passages are necessary to its production, they do not demonstrate the fact that local nasal disease is the sole excitant of the paroxysm. The views given above have been confirmed by the clinical experience of a number of physicians, among whom may be prominently mentioned Drs. Sajous, of Philadelphia, Bosworth, of New York, and Ingals, of Chicago. Several months after the publication of Dr. Allen's views, we endeavored to reconcile the discrepancies met with in the results of different observers, and advanced the theory which we give here in brief:—

According to our conception, as outlined in several articles published during the last few years, the so-called nasal reflex neuroses, whether taken singly or collectively, as in the case of the *ensemble* of phenomena known as "hay fever," may be regarded as the Protean manifestations of a morbid condition to which we have given the name *Rhinitis Sympathetica*, and which is characterized by a hyperæsthetic condition of the vaso-motor nerve-centres linked to a peculiar excitability of the nasal cavernous tissue. For, if we inquire what condition or conditions is common to them all, and what morbid process is capable of producing them either singly, or in combination; how phenomena apparently so widely different in character and anatomical sphere of operation may be traced to a solitary source, we find the answer in certain more or less clearly defined changes in the nasal apparatus and in a certain exalted state of the sympathetic nervous system, to which latter we instinctively turn as the organ most conspicuously concerned in the evolution of purely reflex acts. In whatever relation the local nasal affection and the condition of the sympathetic stand to each other in the matter of cause and effect, they must both be regarded as inseparable factors in the production of the phenomena under consideration. It matters not to what hypothesis the path of speculation may lead. Of this we can be reasonably sure, that in order to the production of the characteristic symptoms of this disease, a certain excitability of the nasal passages is necessary, *plus* an exalted state of the central nervous system.

From our present knowledge of the disease, it seems difficult to escape the conclusion that its pathology is intimately interwoven with a morbid condition of the vaso-motor sympathetic, and probably a hypersensitive state of the nerve-centres themselves. When we recall the fact that in the famous section of the sympathetic in the neck by Claude Bernard symptoms similar to, or closely allied to the phenomena of hay fever were produced; when we reflect upon the results reached by Prevost in his experiments on the spheno-palatine ganglion, is there not a clue to lead us through the labyrinth of our difficulties to a rational solution of the question? Whatever be the essential cause of the disorder, do not its phenomena point directly to a circumscribed disturbance of the vaso-motor sympathetic? What the histological condition of the centres or the nerves themselves may be, is in the present state of our knowledge a matter of conjecture; but this much is probable, that their normal impressibility is so increased that when subjected to various forms of stimulation an explosion of nerve-force takes place which is represented to our senses by certain vaso-motor disturbances in the nasal passages and other portions of the mucous tract dominated by the cervico-occipital sympathetic. The organs which bear the brunt of the attack are the nasal passages, and the exalted condition, erethism of the turbinated corpora cavernosa, is therefore the leading, distinguishing and characteristic feature of the paroxysm, constituting, as it were, the central symptom around which the other phenomena of the paroxysm are grouped, and from which many of them proceed, either as the result of mechanical causes or from reflex action. The discomfort and more serious symptoms of the disease commence with the swelling of this tissue, and are dissipated with the subsidence of the same. Whatever be the exciting cause of the paroxysm, the tendency to secondary erection of this tissue plays an important *rôle* in its mechanism, and, just as in an ordinary coryza, the central symptom, the most prominent condition, is represented by the swelling of the cavernous bodies.

Indeed, whatever the other elements of the paroxysm may be, the phenomena referable to the cavernous tissue constitute the mainspring of the machinery by which it is set in motion. As the distinguishing feature of the paroxysm resides in an exalted condition of this tissue, by diminishing or abolishing its reflex excitability we eliminate the leading element in the complex mechanism of the attack. Now, our experience shows that, while all parts of the nasal mucous membrane may be sensitive to reflex-producing impressions, the most sensitive area is located in the lower posterior portions of the nostrils, a zone corresponding to the distribution of the spheno-palatine branches of the superior maxillary nerve as distinguished from the nasal branch of the ophthalmic. The former nerve, derived through the spheno-palatine ganglion, probably contains therefore the vaso-motor fibres which govern the erection of the turbinated tissue, and as the sympathetic filaments which have been traced to the nasal passages are found in greater abundance over this area, we may for practical purposes speak of a *nasal plexus* located in the sensitive area and intimately associated with the evolution of the nasal reflex. The clinical observations of Roe, Sajous, Ingals and others, and our own, show that this is precisely the area of greatest turgescence and excitability during the paroxysms of the disease, and the localization of the "sensitive area" may therefore be looked upon as the key to the mechanism of the attack. Just here, we would like to call attention to a property of erectile tissues which is consonant with the ideas of reflex excitability formulated above, and which may possibly in a measure explain the relation of erection of the nasal cavernous tissue with the vaso-motor manifestations of the sympathetic form of rhinitis. In the human body, wherever erectile tissue is found, it is intimately related to reflex or sympathetic acts; there seems to be connected with it a certain receptivity to reflex-producing impressions, a certain power of reflex excitability dependent upon its structure and functions. It is thus peculiarly a tissue of sympathy in which we may most satisfactorily study the mechanism of purely reflex or sympathetic acts. Now it seems to us, that, as the nasal corpora cavernosa belong to this class of sympathetic tissues, there will be little difficulty in explaining the *rôle* which they play in the paroxysms of an affection which is probably connected with, if not dependent upon, an excitation of the sympathetic nerve-centres, and in more clearly defining the intimate relation which its erection bears to the reflex manifestations of the disease under review.

For practical purposes, then, we may regard the affection as a coryza dependent upon some derangement of the nerve-centres as its essential cause. The latter may be inherited or acquired; in the latter case it may be brought about in a number of different ways. In the first place it may be the result of pathological conditions of the nasal passages themselves, generally associated with repeated and prolonged erection of the cavernous tissue with subsequent abnormal irritation of the nerve-centres. The nasal disease itself may be developed in the first instance from direct or indirect (reflex) irritation, begetting a hyperæsthetic condition of the nasal passages, and eventually disordered activity of the centres. When therefore the former are exposed to undue irritation, either from *ab extra* influences or from internal causes, an explosion of nerve-force takes place in the centres which expresses itself as a paroxysm. We might illustrate this mechanism by referring to the operation of the *aura* in epilepsy, and the excitation of the spinal nervous system produced by abuse or disease of the generative apparatus.

The excessive irritability of the nasal tissues may be brought about, in another class of cases, by an exalted state of the central nervous system, leading eventually to derangement of the vaso-motor centres, or, finally, a hyperæsthetic condition of the latter may be occasioned by other pathological states of the system as a whole, or as the result of reflected irritation from its individual parts. Whatever be the avenue through which the exciting cause operates, two factors seem to be inseparably associated in the production of the paroxysm—a hyperæsthetic condition of the nasal erectile area, and a derangement of the nerve-centres.

In calling special attention to the irritability of the nasal erectile—or contractile—tissue, we do not by any means seek to overlook the vaso-motor manifestations in other portions of the respiratory apparatus, and even in other organs not directly connected with it. On the contrary, the explosion of vaso-motor force expends itself upon other portions of the tract dominated by the cervico-occipital sympathetic. Just as in a cold in the head, we have symptoms referable to the lower respiratory tract, aural apparatus, eye, etc., so in this form of sympathetic coryza we have disturbances in these and other organs of the body. But the symptoms which stand out in conspicuous prominence are those which spring from the erection of the turbinated tissues. That the manifestations included under the head of asthma, cough, congestion of the conjunctiva, etc. etc., may proceed from this source alone, is shown by their immediate dissipation upon removing the source of irritation in the nasal passages by topical applications, instrumental interference, or by the artificial contraction of the swollen tissues. We have been able to illustrate this by the following experiment. In the course of our treatment of one of our cases with the cautery, we noticed that, when the applications were confined to one nostril, the phenomena referable to the corresponding side of the head were completely dissipated, whilst those of the opposite persisted and were only removed upon cauterization of the mucous membrane of that side.

During the paroxysm this tissue, in our experience, is invariably congested and swollen, and exhibits a characteristic irritability entirely out of proportion to that found under ordinary circumstances, that is to say, in simple inflammation of the passages. Indeed, in a large proportion of the class of cases commonly known as "reflex neuroses," this irritability is so exquisite as to render the contact of the blandest applications unbearable to the patient, and this apart from the presence of any of the exciting causes of the paroxysm.

In transferring the point of greatest excitability from the peripheral ends of the nerve-filaments to the centres themselves, we are fully aware of the want of experimental proof in favor of such a view, but we believe that it affords a more comprehensive explanation of the complex phases of the disease than that which is based on the assumption of organic changes in the terminal filaments of the sensitive nerves.

In accordance with the views expressed above, we proposed some time ago to substitute, for the various names given to this affection, the term *coryza vasomotoria periodica*—a proposition to which Dr. Mackenzie objects on the ground that it involves the acceptance of an unproved theory, although he employs one himself which involves the resurrection of a disproved hypothesis. While we do not claim that the theories advanced by American physicians embody the complete and final settlement of the question, we regard them as less objectionable than those heretofore advanced; we believe that, in indicating the line of future

research, they bring the problem one step nearer its solution, and that by viewing it from the standpoint they suggest, we may catch a broader glimpse of its protean aspects, and be in a securer position to relieve the sufferings of our patients than if we follow the narrow pathway along which the pollen theorists ride their hobby to an invariably unsatisfactory and unsuccessful result.

To our views on the subject of "hay fever," Dr. Mackenzie has two objections to offer: (1) that we do not "realize the true nature of hay fever as a periodical disease occurring *only* during the season when hay or certain flowers are in blossom;" and (2) that "our views of the sensitive area are directly opposed by Dr. Hack, who holds that reflex manifestations do not occur until the anterior part of the lower turbinated body has first become turgid." In regard to the first objection we have this to say: first, that we distinctly recognize the paroxysmal or periodical nature of the disease, both in our definition and in our first communication on the subject; secondly, that while it is true that a large proportion of cases suffer only during certain months of the year, our clinical observation teaches us that in a certain number typical paroxysms occur at all seasons of the year, provided the patients are subjected to the conditions which we have outlined above. Dr. Mackenzie apparently reasons from the assumption that the complex etiological relations of the disease have been thoroughly investigated and definitely determined, and seems to disregard the fact that we are yet on the threshold of inquiry in this direction, that we are just beginning to discover in the many phases of this affection things undreamt of before in our philosophy, and that the true conception of the disease can be reached, not from the exclusive study of external causes, not from the hasty generalizations of isolated experience, but from the higher vantage-ground which overlooks the subject in all its bearings, which brings within our range of vision new facts and new discoveries, from which, in fine, we can regard more clearly the subject himself, and his complex relations to the external and internal forces by which he is influenced and surrounded. As an idiosyncrasy stands for something which is inexplicable, and as "nothing explains why some persons should be affected by pollen and not others," a correct and adequate definition of this affection from the standpoint of Dr. Mackenzie is a logical impossibility. If we have no clear conception of the essence of a thing, it is obviously impossible to define it, and it is therefore highly unscientific to measure the value of independent observation by the criteria of an arbitrary definition.

To Dr. Mackenzie's second objection we would reply that our observations upon this subject have received the independent support of competent observers both in this country and abroad, and that Prof. Hack, in his more recent pamphlets, which doubtless had not reached Dr. Mackenzie at the time his essay went to press, has retreated from the exclusive views which he held in his original publication. It is interesting to remark just here, that, while Dr. Mackenzie unhesitatingly approves the result of Prof. Hack's investigations in this direction, he nevertheless, a few pages further on, makes the most deprecatory insinuation concerning the work of his German *confrère*, who has done so much to throw new light upon this field of nasal pathology. The objection which he urges to the contention of Drs. Daly, Roe, and Allen, that "so few of the many sufferers from nasal disease are affected by the pollen of plants," assuming that the disease is caused by pollen, would be admissible were it contended that the affection

is a simple nasal inflammation, and that there is no other factor at work in the mechanism of the paroxysm; but it obviously does not apply to the views outlined above. Applied to the pollen theory, it would carry that interesting conception to a depth from which there could be no resurrection.

Whichever theory be correct, when we come to consider the subject in the light of practical results, we find that the pollen theory offers no hope in the direction of cure; the measures based upon it are simply palliative, and in some respects ludicrous in the extreme; while, on the other hand, the views formulated above offer a prospect of relief in every case and permanent cure in a fair proportion. The cure of the disorder by remedies addressed to the nervous system, to the nasal passages, or both, amounts to the most convincing demonstration, and is a complete and practical answer to the pollen assumption. Dr. Mackenzie's deprecatory remarks on the treatment advocated by American physicians can have very little weight, as he acknowledges that he has but imperfectly studied the question from their standpoint, and has had no practical experience with the improved methods they suggest; but it is a significant fact that the only Englishman who has adopted the American plan, Mr. Lennox Browne, has obtained from it most satisfactory results. If the dissipation of the disease by a given method does not offer "a sufficiently favorable prospect" to justify its adoption, what better criterion of its efficacy, it may be asked, would Dr. Mackenzie require in judging of the merits of the operation? There is, perhaps, no more striking commentary on the inadequacy of the pollen speculation than the Cimmerian darkness it has thrown around the treatment of the disease, and we are therefore not surprised when Dr. Mackenzie informs us that the treatment is "unsatisfactory," and that "prevention is better than cure." But let us turn our eyes for a moment from the horrors of the American method to the pleasant prospect of relief afforded by the pollen theorists, and reflected in the pages of Dr. Mackenzie's essay.

If a life on the ocean wave or a home on the rolling deep be impracticable, "dwellers in towns should avoid the country" and those who reside in the country should proceed at once to "the centre of a large town," or, if this be out of the question, "the patient should remain, if possible, within doors during the whole of the hay-fever season." Active exercise should be carefully avoided, and if the sufferer ventures out of doors, "he should, if possible, avoid the middle of the day," or, if obliged to sally forth at that inauspicious hour, "should protect his eyes by wearing spectacles with large frames accurately adapted to the circumference of the orbits; or he may find some advantage in wearing a hat with a very broad brim." As rapid motion in the open air aggravates the complaint, "it may be advantageous to wear a veil over the face whilst driving or riding. One made of 'three ply' of fine silk gauze has been recommended," but Dr. Mackenzie finds a "double gossamer," which can be had in several colors, answer the purpose in some cases. "Plugging the lachrymal ducts with glass rods," "*closing* the nostrils with a metal clip," and wearing an apparatus containing carbolic acid and camphor within the nostrils, are also suggested to secure comfort to the sufferer. "Protected in this way," says Dr. Mackenzie, "many people disposed to hay fever escape altogether, whilst others contract the disease in a very mild form." To his everlasting credit be it said, however, that he "cannot recommend" the glass rods and metal clip, but he nevertheless adds, "the nostrils may be *plugged* (italics Dr. Mackenzie's) with cotton-wool

or wadding by means of one of Gottstein's screws." Apart from many other inconveniences attendant upon such a line of treatment, imagine the tortures of confinement to a closed chamber during the intense heat of our summer months; fancy the spectacle which the victim presents with his eyeballs covered with an unsightly apparatus, his lachrymal ducts filled with glass rods, and his nostrils plugged with cotton—a form of *secundum artem* torture which recalls the ingenuity of Torquemada. But if this should not suffice, consistence with the pollen idea may demand that other avenues be also closed, that the intra- and extra-aural pressure be equalized by tamponing the auditory meatus, and that, in order to avoid the inevitable access of pollen to the respiratory structures which must follow the necessary patency of the mouth, that avenue should be also peremptorily sealed. The experiments of Blackley show that pollen grains may be retained in the clothing for many weeks, and that when let loose upon a mucous membrane they are capable of producing unlimited havoc, and the suggestion naturally arises, why not apply the glass-rod method to the urethra, and the respirator and tampon to the rectum? It has also been proved (to the satisfaction of the pollen theorists) that the disease may commence as an irritation of the skin by the ubiquitous pollen, and it is even possible, if we follow out Mr. Wilson's idea, that the pollen granule may enter the cutaneous capillaries. But, thanks to chemistry, we have an effectual barrier to such intrusion in shellac. As the pollen granule is one-tenth the size of the blood-corpuscle, it is readily conceivable that the means suggested above may prove ineffectual, and we therefore see no escape from inclosing the patient in some form of apparatus like the diving-bell, to which the air may be conducted from the nearest mountain top. But some captious critic may inquire, "With the *primæ viæ* thus hermetically sealed, how is the patient to breathe under the conditions you suggest?" This conundrum has been solved by a surgical friend of ours, who proposes that, as the lower respiratory tract is probably least sensitive to the action of pollen, the operation of tracheotomy be performed—a proposition which we cheerfully commend to those who follow the treatment of Mr. Blackley.

Let, then, the patient, prepared according to the directions given above, don his broad-brimmed hat, fold about him the three-ply gauze, or double gossamer of the rainbow hue, and hie him to the centre of the nearest town where the passer-by may recognize the embodiment of the victory which science has won over disease—"*monumentum aere perennius.*"

In the light of recent discovery, and in accordance with our views in regard to the pathology of the disease and the mechanism of its paroxysms, we believe that the general principles governing its treatment may be briefly defined as follows: It should be remembered, at the outset, that the vaso-motor manifestations, of which the erection of the turbinated corpora cavernosa is the central and most conspicuous, are secondary phenomena dependent upon a direct impression made upon the nasal mucous membrane, or on indirect influence conveyed or reflected through the vaso-motor centres from a distant organ; or, finally, from some excitation starting in the centres themselves. Any treatment, therefore, addressed to the nasal chambers, except in the case of the destruction of the cavernous tissue, accomplishes thus one result, and one only—it closes one door against *ab extra* irritation of the nerve-centres. In order to exclude completely the influence of the latter, careful search should be made for any pathological condition, systemic or local, which may be

regarded as a source of direct or indirect irritation, and appropriate treatment adopted. Recognizing the prime importance of the reflex excitability of the nerve-centres and the resulting vaso-motor manifestations, an endeavor should be made so to alter the nutrition of the central nervous system that the centres may not respond so easily to the reflex-producing impression. Failing in the above methods, the partial, or if necessary complete, destruction of the cavernous tissue corresponding to the sensitive area should be undertaken. In the majority of cases it is neither necessary nor desirable to destroy large areas of tissue, the amount to be sacrificed depending upon the exigencies of the particular case.

The treatment of the disease by cauterization, which has been carried out so successfully in this country and Germany, has been criticized in England and France, but it is a noteworthy fact that the criticisms have emanated from those who have had no personal experience with the method. A recent French writer of this class has gone so far as to characterize it as an "audacious" procedure. But it should be remembered that it was a Frenchman who referred in similar terms to the first operation of McDowell, and a representative Englishman who cried *Credat Judæus Apella* at the mention of a procedure which has done so much to render the modern surgery of Great Britain illustrious.

In that highly instructive and philosophical production, Gil Blas, occurs the following passage, whose application we leave to those of our transatlantic friends who positively refuse to make trial of the American methods:—

"'Sir (said I, one evening to Dr. Sangrado), I take Heaven to witness that I follow your method with the utmost exactness; yet, every one of my patients leaves me in the lurch. It looks as if they took a pleasure in dying, merely to bring our practice into discredit. This very day I met two of them going to their long home.' 'Why, truly, child,' answered he, 'I have reason to make pretty much the same observation; I have not often the satisfaction of curing those who fall into my hands; and if I was not so sure as I am of the principles upon which I proceed, I should think my principles were pernicious in almost all the cases that come under my care.' 'If you will take my advice, sir,' said I, 'we will change our method and give chemical preparations to our patients, through curiosity; the worst that can happen will only be that they produce the same effect that follows our bleedings and warm water.' 'I would willingly make the experiment,' he replied, 'provided it would have no bad consequence; but I have published a book in which I have extolled the use of frequent bleeding and aqueous draughts: and wouldst thou have me go and deny my own work?' 'Oh, you are certainly in the right!' said I; 'you must not give your enemies such a triumph over you; they would say you are at best disabused, and therefore ruin your reputation; perish rather the nobility, clergy, and people, and let us continue in our old path.' . . . . 'We went to work, therefore, afresh, and proceeded in such a manner, that, in less than six weeks, we made more widows and orphans than the Siege of Troy.'"

We are sorry that we are compelled to speak thus disparagingly of the views advocated in the brochure of Dr. Mackenzie, but we cannot allow our admiration of the author's ability to interfere with our duty as reviewer. His work is written in his well-known agreeable style, and he has put the pollen theory in as an attractive light as is possible under the circumstances. Championing a feeble cause, his defence is naturally weak, and if he has not thrown new light upon the subject, it is because he is trammelled by the contradictions and many inexplicable questions inseparably associated with the hypothesis into which he has endeavored to breathe new life. He views his subject from the standpoint of Blackley,

and has not sufficiently investigated it in the light of recent revelations. We believe that our distinguished author would better employ his powers in exposing its fallacies than in apologizing for a theory which represents not progress, but retrogression.

The pollen idea is better adapted to please the imagination than to persuade the reason. Like the fabled Icarus, in attempting to go beyond its legitimate sphere, it has failed in the accomplishment of its object. Criticism is necessary to knowledge, and erroneous doctrine may in this way lead to more perfect understanding, and in this sense the pollen theory may be said to have accomplished a useful purpose; but, on the other hand, by diverting the mind from more essential etiological conditions, by introducing an insuperable element of confusion into the investigation of the disease, it has contributed in a large measure to retard the progress of therapeutic inquiry. Deliverance from false conceptions based on traditional belief is a task difficult of accomplishment. May we not hope for the co-operation of Dr. Mackenzie in this direction?

Let us, finally, commend to the future historian of this affection the exile of the terms "hay fever" and "idiosyncrasy;" let us hope that the time is not far distant when the pollen theory shall be relegated to its proper historical place as an interesting speculation; that the next essay which treats of it will bear as its motto the eloquent *in memoriam*, or the terse and homely *hic jacet*. May we not even indulge the belief that the next edition of the work before us will be devoted, not to the resurrection of a defunct hypothesis, but to the elaboration of its epitaph?

J. N. M.